

### **Tonight's Agenda**

TMDL Overview – Jason Hill (VDEQ)

TMDL Details — Raed El-Farhan and Djamel Benelmouffok (Berger Group)

Question and Answer - All



### Why Am I Here?

- Water Quality Problem = Special Study (TMDL)
  - Sacteria Standard Violations (De-listed)
  - Specific Dissolved Oxygen Standard Violations
  - Siological Monitoring Indicates Stressed Community
- Need Community Participation to make the Study more Accurate



#### What is a TMDL?

#### TMDL = Total Maximum Daily Load

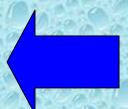
- The Amount of Pollution A Stream Can Receive and Still Meet Water Quality Standards
- A TMDL Study ID's All Sources of Pollution
- Calculate the Amount of Pollutants Entering the Waterbody from Each Source.
- Calculate the Reductions in Pollutants, by Source, Needed to Attain/Maintain Water Quality Standards.

### Why Do A TMDL?

- 1972 Clean Water Act (CWA)
  - Periodic Assessment and Impaired Waters Listing
  - Develop TMDLs for Impaired Waters
- 1997 Water Quality Monitoring Information and Restoration Act (WQMIRA)
  - Requires TMDLs for Impaired Waters
  - Requires an Implementation Plan

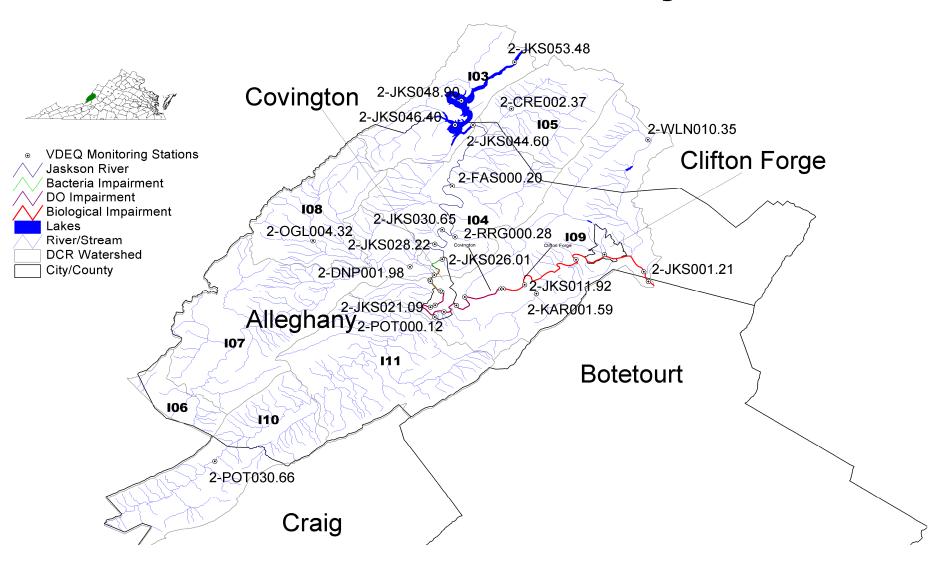
#### **TMDL Development Steps**

- Place impaired waters on 303(d) list due to water quality standards violations
- Develop TMDL(s) for impaired waters (one per pollutant)



- > Develop TMDL implementation plan
- Implement TMDL
- Remove waters from 303(d) list when water quality standards achieved

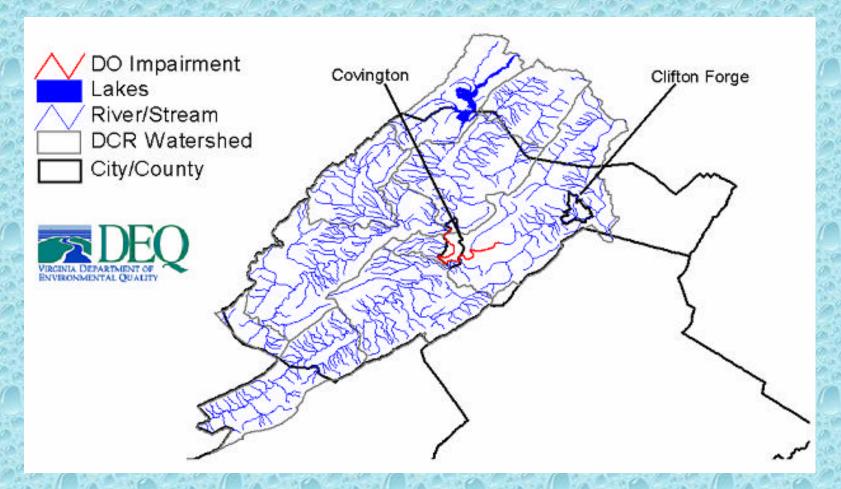
#### **Jackson River TMDL Study Area**





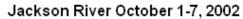


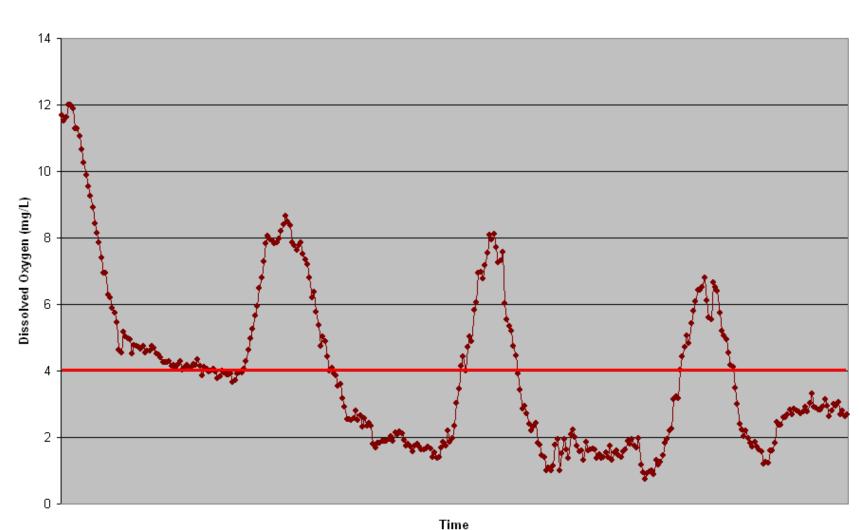
## **Dissolved Oxygen**



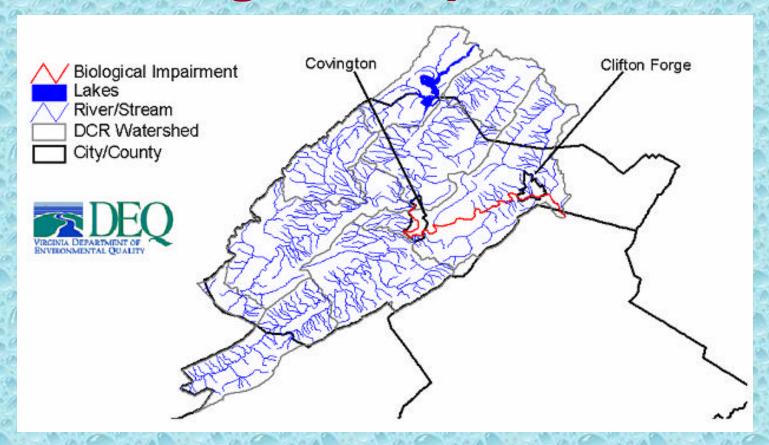
11.21 mile segment was listed for low dissolved oxygen (not supporting aquatic life use). Diurnal DO recorders during early fall in the past have found large diurnal swings.

# **Dissolved Oxygen**





## **Biological Impairment**



24.21 mile segment was listed as not supporting aquatic life use using biological monitoring data.

### **Biological Monitoring**

A tool for detecting environmental impacts that are too subtle to be detected by standard chemical monitoring networks

Why? General Standard => "all state waters shall be free from substances... which are harmful to aquatic life"

- Benthic macroinvertebrate communities reflect overall ecological integrity (chemical, physical, biological)
- Chemical monitoring can miss periodic pollution events and does not assess habitat quality

When impairments are discovered, an in-depth investigation must be completed to identify the source(s) of the impairment (TMDL)

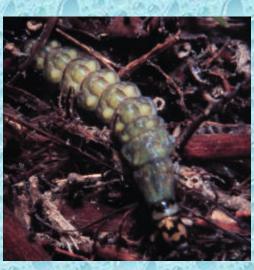
### Intolerant Organisms



**Mayfly** 



**Stonefly** 



Caddisfly



**Water Penny** 



Riffle Beetle

## Moderately Tolerant Organisms



Crayfish



**Dragonfly** 



**Netspinning Caddisfly** 



**Aquatic Sowbug** 



Cranefly

## Tolerant Organisms



**Midge Larvae** 



**Segmented Worm** 



**Pouch Snail** 



Leech



**Flatworm** 

## **Stressor Development**

Reviewed of Biological, Habitat and Chemical Data

#### **Primary Stressors:**

- Nutrients (Nitrogen and Phosphorus)
- Excess Peripyton Growth



#### **TMDL** Results

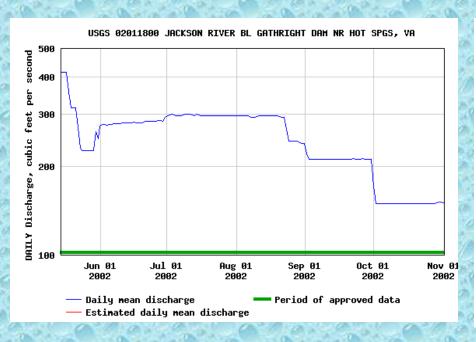
To Reach TMDL Goal of 100mg/m^2 of peripyton during growing season

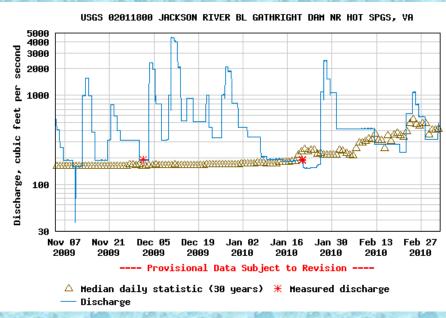
Nutrient Limits at Permitted Facilities:

- MWV (3.7 mg/L TN, 0.021 mg/L ortho-P)
- Covington STP (6.0 mg/L TN, 0.5 mg/L TP)
- Clifton Forge STP Closed (going to lower Jackson)
- Lower Jackson STP (6.0 mg/L TN, 0.5 mg/L TP)
- Low Moor STP (14.0 mg/L TN, 1.15 mg/L TP)

Alter Flow Regime to Mimic Storm Events

# 216 Study - Flow Changes





**Current Growing Season** 

Mimic Storm Events

## **Monitoring Plan**

216 Special Study (2010-2012)

- Bimonthly: Solids, Nutrients, DO, pH, Conductivity, Temp
- Biannual: Metals, Peryipyton Samples
- Biannual: Macroinvertebrate monitoring (flow dependant)
- Annual Fish Community monitoring

#### **Current Conditions**

Already seen significant decrease in phosphorus loads, which improved water quality

#### **Biomonitoring Results:**

	Impaired Sites (1994-2003)			
	City Park	Route 18	Low Moor	Dabney Lancaster
Average (n=12-15)	29.4	45.0	38.8	41.5
	Impaired Sites (2004-2007)			
	City Park	Route 18	Low Moor	Dabney Lancaster
Spring 2004	57.4		40.3	54.5
Fall 2004	48.8	67.3	38.6	58.8
Fall 2006	33.3	50.3	57.6	68.4
Spring 2007	32.9	57.0	36.7	64.3
Average (n=3-4)	43.1	58.2	43.3	61.5

#### **Dissolved Oxygen Results:**

- DO levels now above minimum standards even during the drought with flow variance (100 cfs)
- Diurnal swings 2-3 mg/L per day instead of 6-8 mg/L
- Model output show nutrient reduction reduces DO swings



## **Contact Info**

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#### **Presentations:**

http://www.deq.virginia.gov/tmdl/mtgppt.html

#### **Reports:**

https://www.deq.virginia.gov/TMDLDataSearch/DraftReports.jspx